

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

2006 Driveline/Axle

Wheel Drive Shafts - Lucerne

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Inner Joint Large Seal Clamp	176 N.m	130 lb ft
Outer Joint Large Seal Clamp	176 N.m	130 lb ft
Wheel Drive Shaft Spindle Nut	160 N.m	118 lb ft

COMPONENT LOCATOR

WHEEL DRIVE SHAFTS DISASSEMBLED VIEWS

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

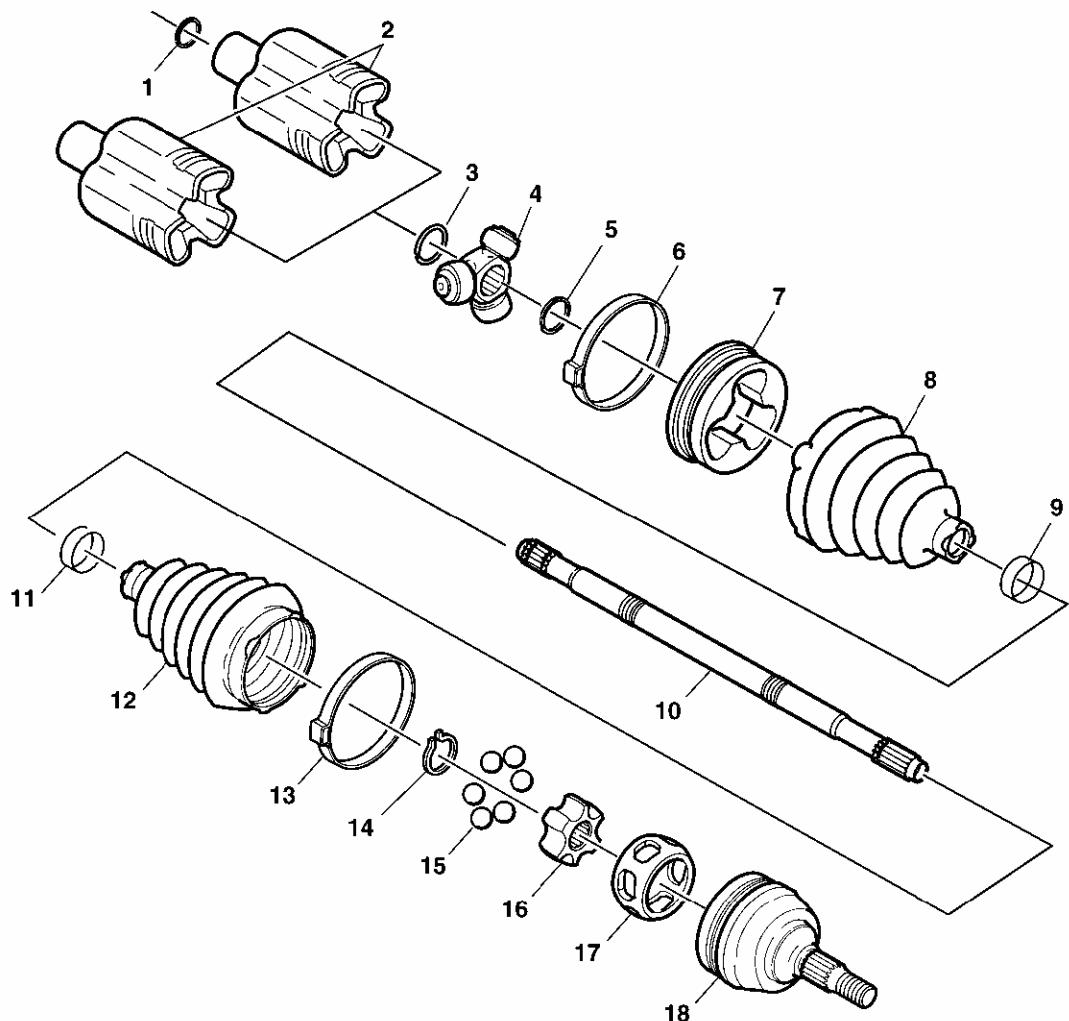


Fig. 1: Wheel Drive Shafts Disassembled View

Courtesy of **GENERAL MOTORS CORP.**

Callouts For Fig. 1

Callout	Component Name
1	Retaining Ring
2	Retainer and Housing Assembly
3	Spacer Ring
4	Tripot Spider Assembly
5	Spacer Ring
6	Seal Retaining Clamp
7	Tripot Trilobal Bushing
8	Inboard Seal
9	Swage Ring

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

10	Halfshaft Babal Bushing
18	Snager Ring
19	Swingarm Ring
13	Seal Retaining Clamp
14	Race Retaining Ring
15	Chrome Alloy Balls
16	CV Joint Inner Race
17	CV Joint Cage
18	CV Joint Outer Race

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - WHEEL DRIVE SHAFTS

Begin the wheel drive shaft system diagnosis with **Diagnostic Starting Point - Vibration Diagnosis and Correction**. The use of the Diagnostic Starting Point will lead to the identification of the correct procedure for diagnosing the system and where the procedure is located.

CLICK NOISE IN TURNS

A constant velocity joint which is worn or damaged may cause a click noise during turns. This may be more apparent while simultaneously turning and accelerating. This click is caused by wear and/or damage to the constant velocity joint bearings and/or races. Commonly, this damage or wear is caused by the loss of lubricating grease from the constant velocity joint and the entry of foreign material or contaminates.

Carefully inspect the wheel drive shaft seals (boots) for cuts, tears or other damage which may allow the lubricating grease to escape. The loss of this grease will cause damage to the wheel drive shaft constant velocity joint in a very short period of time. If the seals (boots) do not exhibit evidence of lubricant loss or damage, remove the wheel drive shaft from the vehicle and rotate the constant velocity joint by rotating in a circular motion. The action of the constant velocity joint should be smooth and even. If any binding and/or roughness is felt while performing this inspection, the constant velocity joint requires replacement.

CLUNK WHEN ACCELERATING FROM COAST

A clunk noise occurring when accelerating from coast or a standing start may be caused by a worn or damaged wheel drive shaft tripot joint. The common cause of wheel drive shaft tripot damage is the loss of lubricating grease and/or the presence of foreign material and contaminates in the joint. This usually occurs as a result of a torn or damaged tripot joint seal boot.

Carefully inspect the wheel drive shaft tripot seal boot for cuts, tears or other signs of damage that may allow the loss of the lubricating grease and/or the entry of contaminates. If the seals appear intact, remove the wheel drive shaft from the vehicle and inspect the tripot joint. Rotate the tripot joint in a circular motion. Do not allow the tripot spider to become disengaged from the race housing or damage to the tripot joint will occur. The movement of the tripot joint should be smooth and even. If any binding or impeded motion is felt, the tripot joint requires replacement.

CLUNK NOISE WHEN ACCELERATING DURING TURNS

A clunk noise that occurs while accelerating during turning may be caused by wear and/or damage to the inboard and the outboard joints in combination. Carefully inspect the joint seals (boots) for cuts, tears or other damage. Joint seals that are damaged may allow lubricant leakage and the entry of foreign materials and contaminates. The loss of lubricant and/or the presence of contaminates can cause damage to the internal components of the joints.

If the seals (boots) are not damaged, remove the wheel drive shaft from the vehicle and rotate the joints in a circular motion. Do not allow the tripot spider to become disengaged from the housing (race). The movement of the joints should be smooth and even. If the joints exhibit any binding or inhibited movement, the joint requires replacement.

SHUDDER OR VIBRATION DURING ACCELERATION

In order to diagnose a shudder or vibration during acceleration, refer to [Diagnostic Starting Point - Vibration Diagnosis and Correction](#) .

REPAIR INSTRUCTIONS

WHEEL DRIVE SHAFT REPLACEMENT

Tools Required

- **J 2619-O1** Slide Hammer With Adapter
- **J 29794** Extension. See [Special Tools](#).
- **J 33008-A** Wheel Drive Shaft Remover. See [Special Tools](#).
- **J 42129** Wheel Hub Remover. See [Special Tools](#).

Removal Procedure

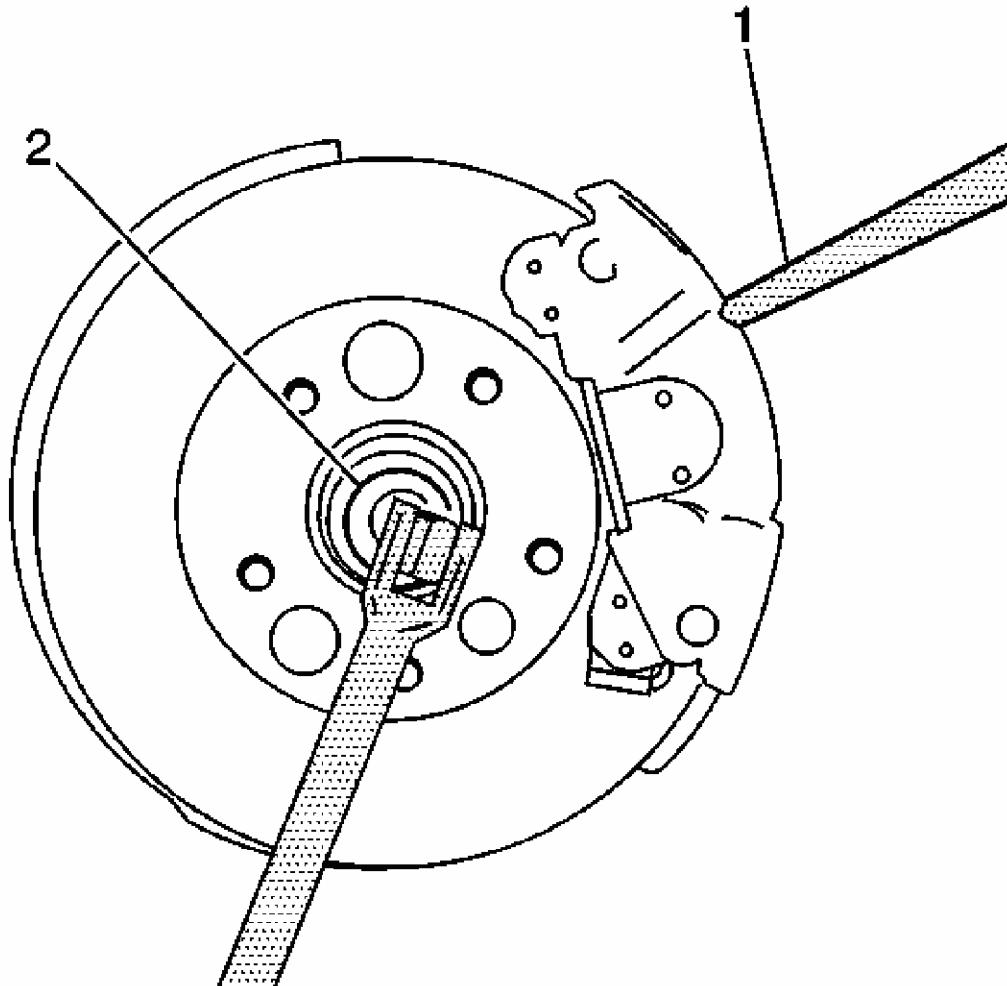


Fig. 2: Preventing Rotor Turning Using Drift Or Punch
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#) .

IMPORTANT: Do NOT loosen the tie rod end jam nut.

3. Disconnect the outer tie rod end from the steering knuckle. Refer to [Rack and Pinion Outer Tie Rod End Replacement](#) .
4. Insert a drift or punch (1) into the brake rotor and against the brake caliper in order to prevent the wheel hub and bearing from turning.

**IMPORTANT: The wheel drive shaft spindle nut must not be reused.
Replace the wheel drive shaft spindle nut with a new nut whenever it is removed.**

5. Remove and discard the wheel drive shaft spindle nut (2) retaining the wheel drive shaft to the hub.
6. Remove the stabilizer shaft link. Refer to [**Stabilizer Shaft Link Replacement**](#).

IMPORTANT: Be sure that the wheel speed sensor wiring harness is repositioned away from the ball joint after disconnecting the electrical connector from the sensor.

7. Disconnect the electrical connector from the wheel speed sensor and reposition the wiring harness away from the ball joint.
8. Disconnect the lower ball joint from the steering knuckle. Refer to [**Lower Control Arm Replacement**](#).
9. Install the **J 42129** onto the wheel hub and secure with wheel nuts. See [**Special Tools**](#).

IMPORTANT: Be sure to support the wheel drive shaft until it is fully removed from the vehicle.

10. Using the **J 42129**, disengage the wheel drive shaft from the wheel hub and bearing and support the wheel drive shaft. See [**Special Tools**](#).

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

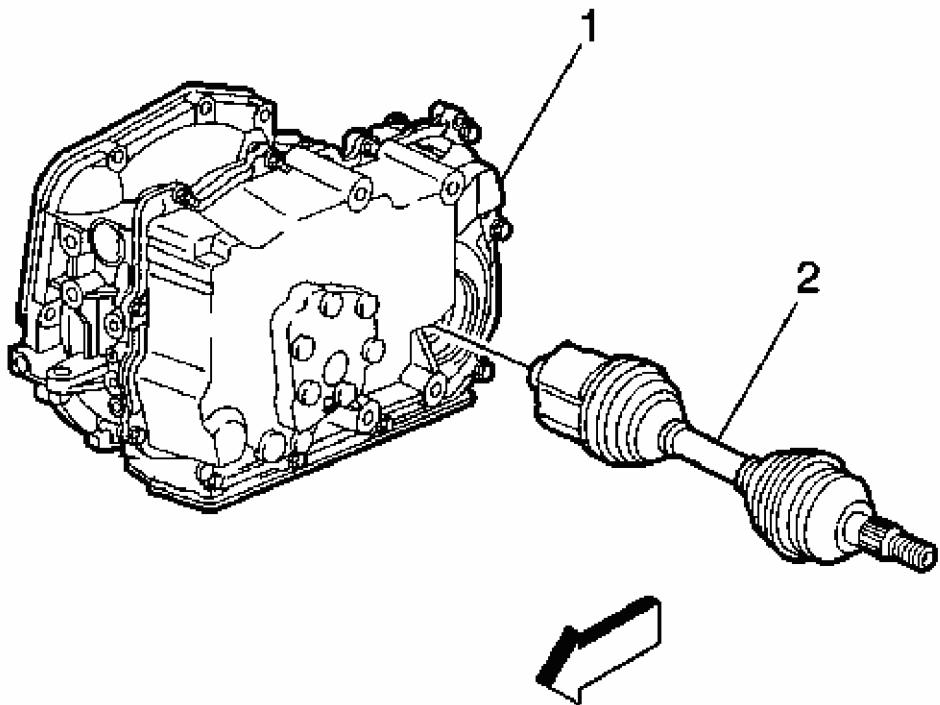


Fig. 3: Removing/Installing Wheel Drive Shaft From/To Transaxle
Courtesy of GENERAL MOTORS CORP.

11. Assemble the **J 2619-O1**, the **J 29794** and the **J 33008-A**. See **Special Tools**.
12. Using the **J 2619-O1**, the **J 29794** and the **J 33008-A**, disengage the wheel drive shaft (2) from the transaxle (1). See **Special Tools**.
13. Remove the wheel drive shaft from the vehicle.

Installation Procedure

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

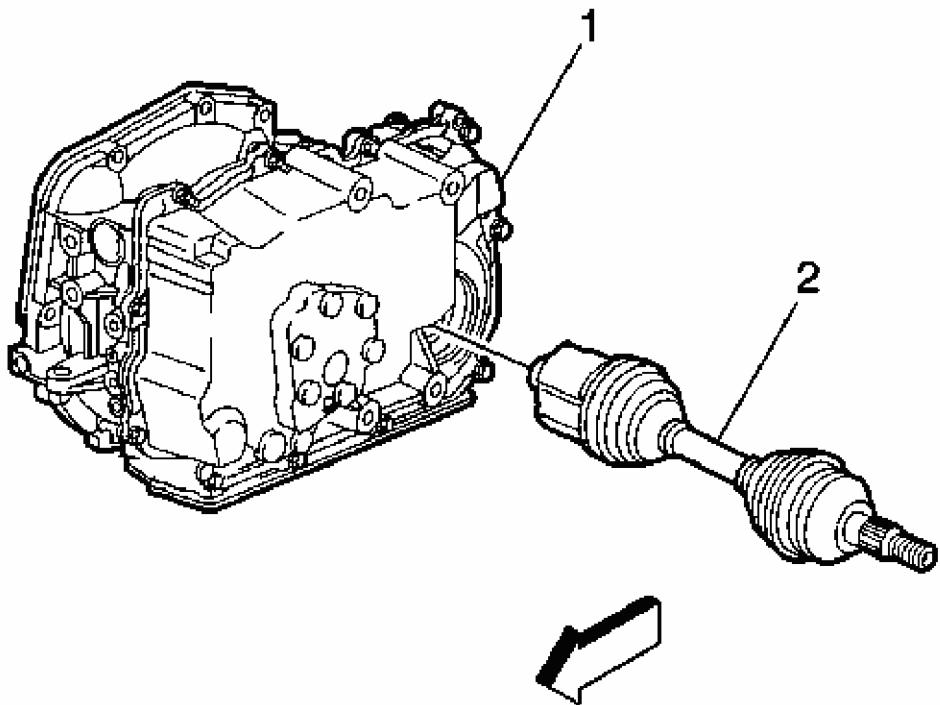


Fig. 4: Removing/Installing Wheel Drive Shaft From/To Transaxle
Courtesy of GENERAL MOTORS CORP.

1. Install the wheel drive shaft (2) to the transaxle (1).
2. Verify that the wheel drive shaft is properly engaged to the transaxle by grasping the inner tripot housing and pulling outward. Do not pull on the wheel drive shaft bar.

The wheel drive shaft will remain firmly in place when properly engaged.

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

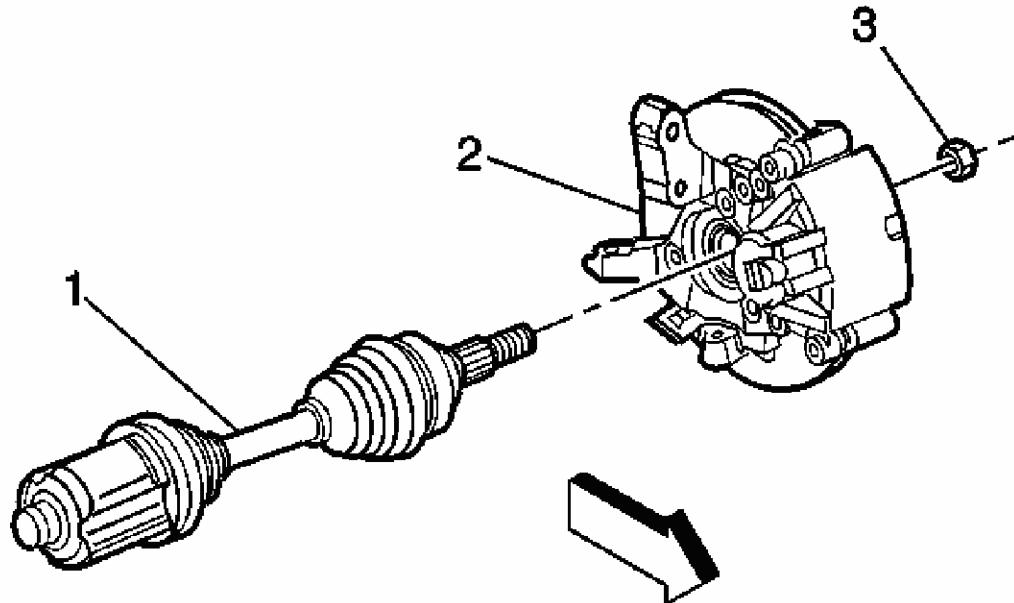


Fig. 5: Installing Wheel Drive Shaft To Hub & Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

3. Install the wheel drive shaft to the hub and bearing (2).
4. Connect the ball joint to the steering knuckle. Refer to [Lower Control Arm Replacement](#).
5. Connect the wheel speed sensor electrical connector.
6. Install the stabilizer shaft link. Refer to [Stabilizer Shaft Link Replacement](#).

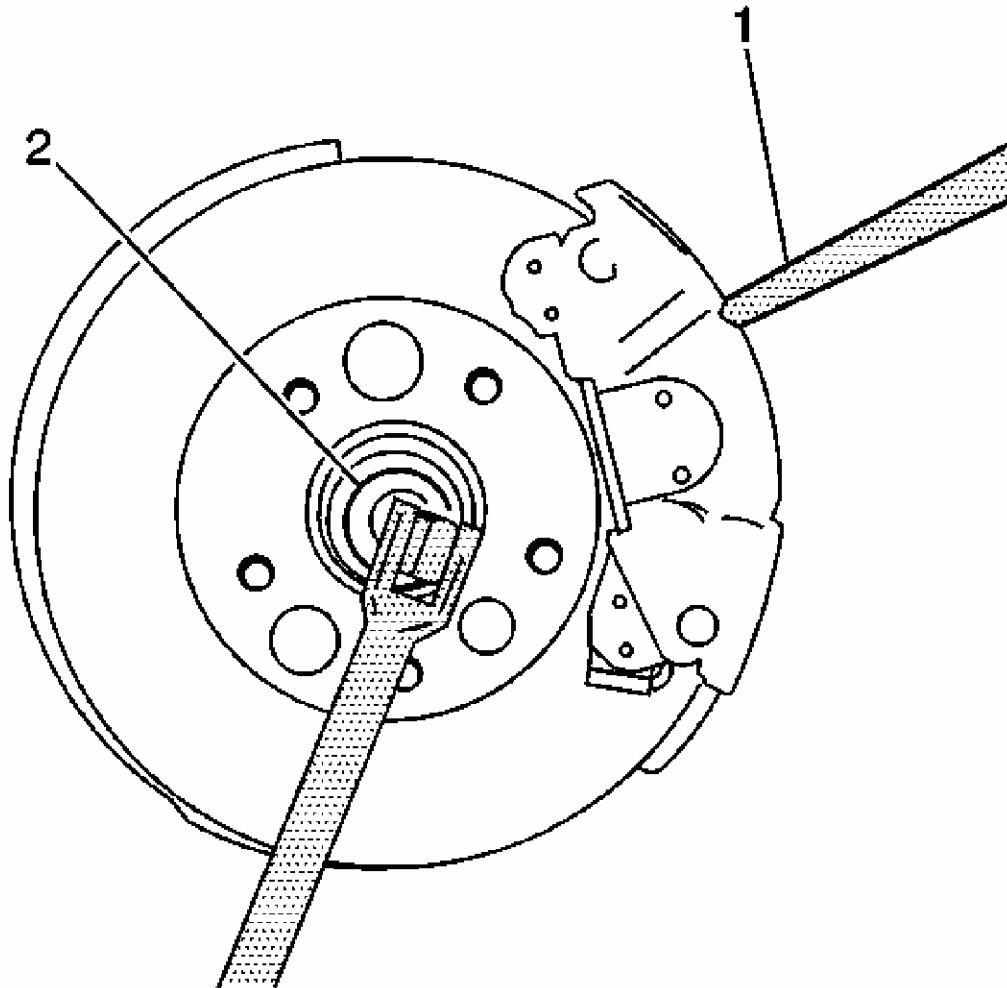


Fig. 6: Preventing Rotor Turning Using Drift Or Punch
Courtesy of GENERAL MOTORS CORP.

7. Insert a drift or punch (1) into the rotor and against the caliper in order to prevent the hub and bearing from turning.

NOTE: Refer to FASTENER NOTICE.

8. Install a new wheel drive shaft spindle nut to the wheel drive shaft.

Tighten: Tighten the wheel drive shaft spindle nut to 160 N.m (118 lb ft).

9. Connect the outer tie rod end to the steering knuckle. Refer to Rack and Pinion Outer Tie Rod End Replacement.

10. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#).
11. Lower the vehicle.

WHEEL DRIVE SHAFT INNER JOINT AND BOOT REPLACEMENT

Tools Required

- **J 35910** Drive Axle Seal Clamp Pliers
- **J 41048** Drive Axle Swage Ring Clamp. See [Special Tools](#).
- **J 8059** Snap Ring Pliers. See [Special Tools](#).

Disassembly Procedure

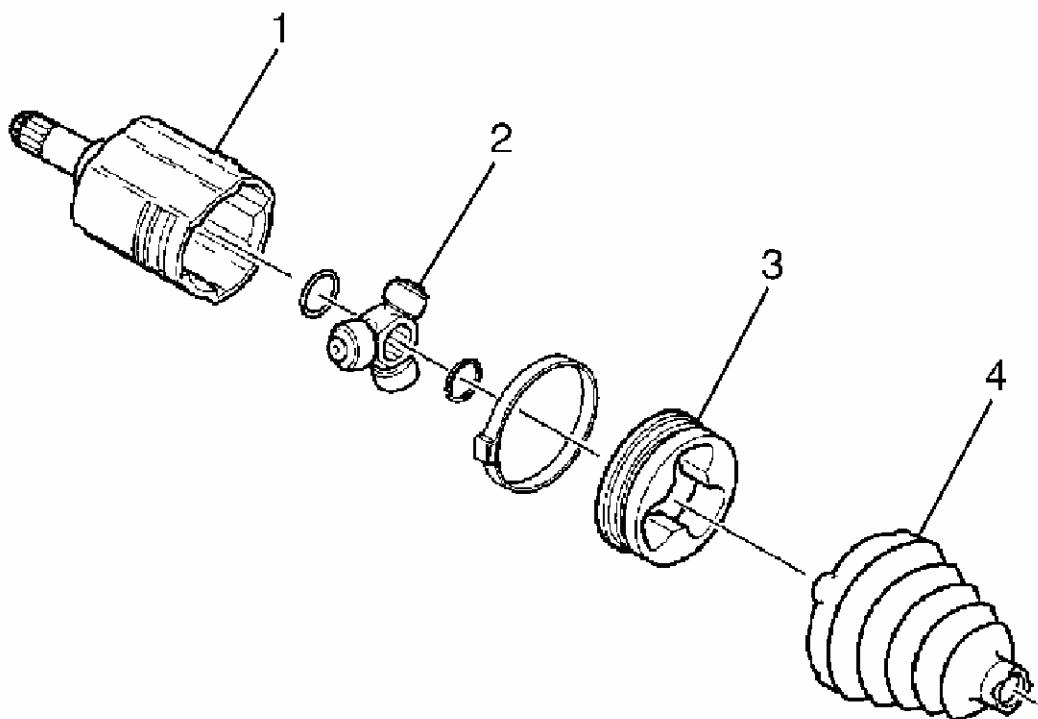


Fig. 7: Identifying Wheel Drive Shaft Components

Courtesy of GENERAL MOTORS CORP.

NOTE: With the removal of the wheel drive shaft for any reason, the transmission sealing surface (the tripot male/female shank of the joint) should be inspected for corrosion. If corrosion is evident, the surface should be cleaned with 320 grit cloth or

equivalent in a rotational motion only. Do not clean with an oscillating motion. Transmission fluid may be used to clean off any remaining debris and the joint wiped dry before installation. Corrosion on the joint sealing surface may damage the transmission seals and cause a fluid leak.

1. Use a hand grinder in order to cut through the swage ring.
2. Remove the large seal retaining clamp from the tripot joint with side cutter.
3. Dispose of the large seal retaining clamp.

NOTE: Do not cut through the wheel drive shaft inboard seal during service. Cutting through the seal may damage the sealing surface of the housing and the tripot bushing. Damage to the sealing surface may lead to water and dirt intrusion and premature wear of the constant velocity joint.

4. Separate the halfshaft inboard seal (4) from the trilobal tripot bushing (3) at the large diameter.
5. Slide the seal away from the joint along the halfshaft bar.
6. Remove the housing (1) from the tripot joint spider (2) and the halfshaft bar.
7. Remove and discard the trilobal tripot bushing (3) from the housing (1).

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

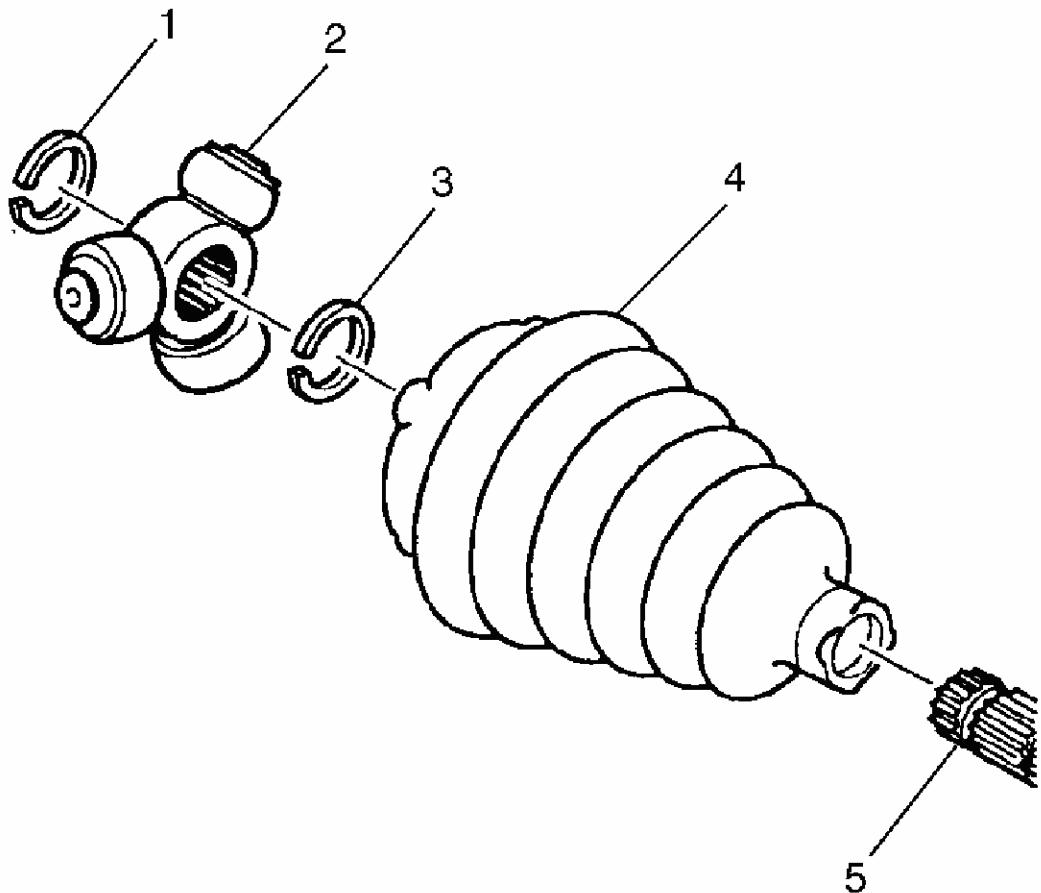


Fig. 8: View Of Spider Assembly, Rings & Tripot Boot
Courtesy of GENERAL MOTORS CORP.

8. Remove the following items:
 - The spacer ring (1) using **J 8059**
 - The spider assembly (2)
 - The spacer ring (3) using **J 8059**
 - The inboard boot (4)
9. Discard both rings and the inboard boot.
10. Clean the halfshaft bar (5). Use a wire brush to remove any rust in the boot mounting area.
11. Clean the following items with cleaning solvent:
 - The tripot balls
 - The needle rollers
 - The housing

12. Remove all traces of old grease and any contaminates. Dry all parts.
13. Inspect the following parts for damage or wear:
 - The tripot joint spider assembly
 - The housing
 - The needle rollers

Assembly Procedure

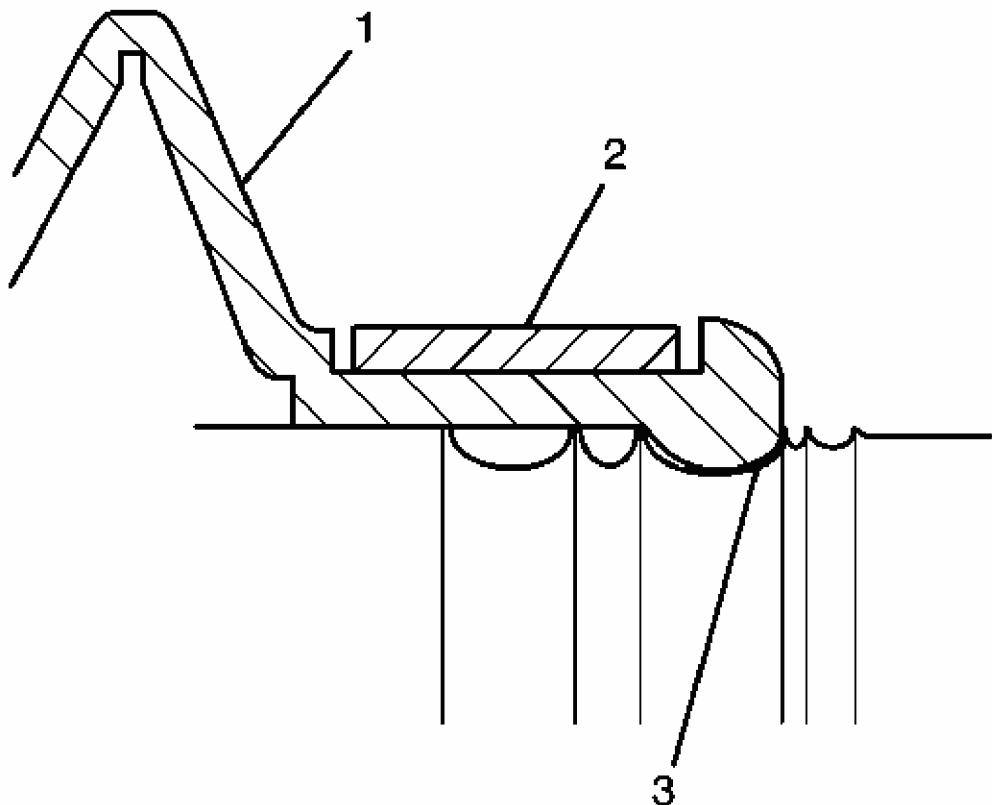


Fig. 9: Installing Seal Clamp On Neck Of Seal

Courtesy of GENERAL MOTORS CORP.

1. Place the new small swage ring (2) onto the small end of the joint seal (1). Slide the joint seal (1) and the small swage ring (2) onto the halfshaft bar.
2. Position the small end of the joint seal (1) into the joint seal groove (3) on the halfshaft bar.

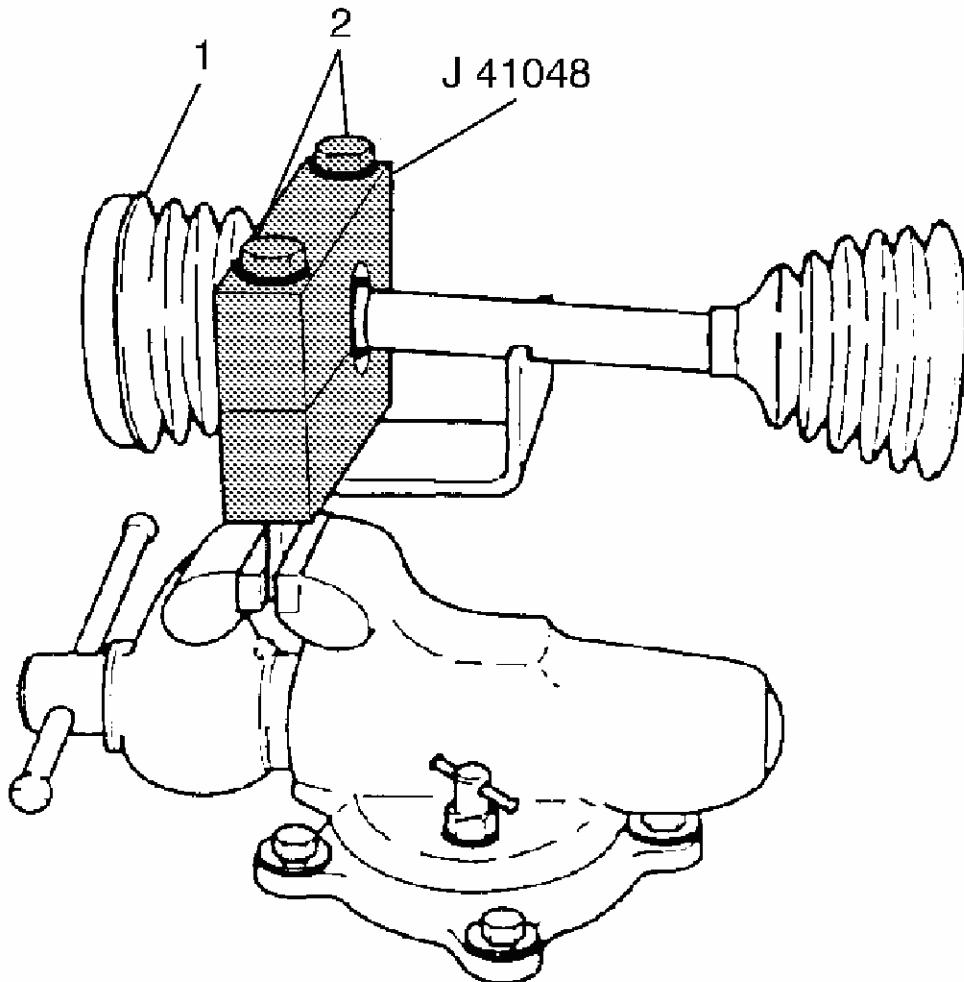


Fig. 10: Swaging Retaining Clamp Ring
Courtesy of GENERAL MOTORS CORP.

3. Mount **J 41048** in a vise and proceed as follows: See Special Tools.
 1. Position the inboard end (1) of the halfshaft assembly in tool **J 41048** . See Special Tools.
 2. Align the top of seal neck on the bottom die using the indicator.
 3. Place the top half of the **J 41048** on the lower half of the **J 41048** . See Special Tools.
 4. Before proceeding, ensure there are no pinch points on the halfshaft inboard seal. This could cause damage to the halfshaft inboard seal.
 5. Insert the bolts (2).
 6. Tighten the bolts by hand until snug.

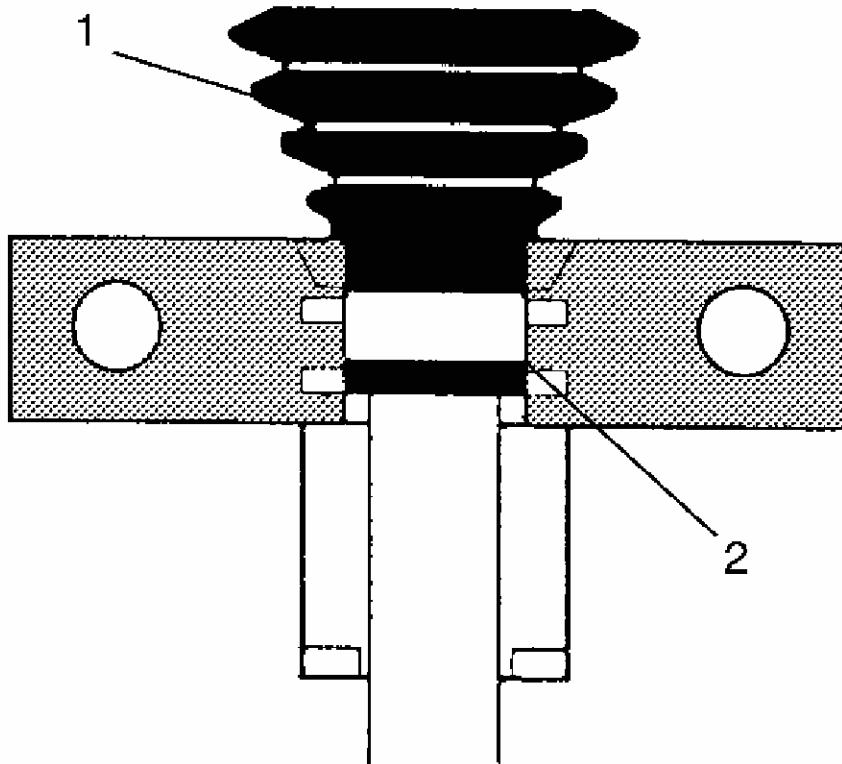


Fig. 11: Identifying Halfshaft Inboard Seal & Swage Ring
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice.

4. Align the following items:

- The halfshaft inboard seal (1)
- The halfshaft bar
- The swage ring (2)

Tighten: Tighten each bolt of **J 41048** 180 degrees at a time using a ratchet wrench. See Special Tools. Alternate between each bolt until both sides are bottomed.

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

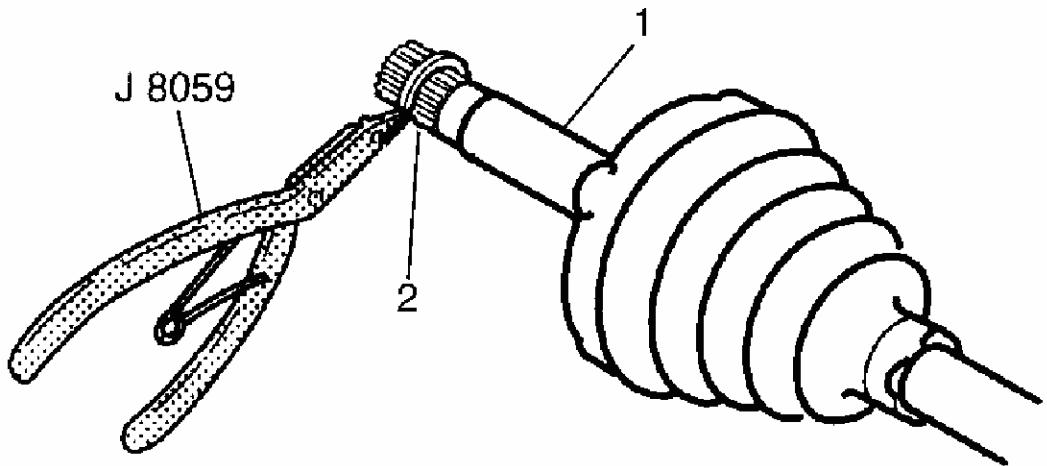


Fig. 12: Installing Spacer Ring

Courtesy of GENERAL MOTORS CORP.

5. Install the spacer ring (2) on the halfshaft bar (1) in the groove using **J 8059**. See **Special Tools**.

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

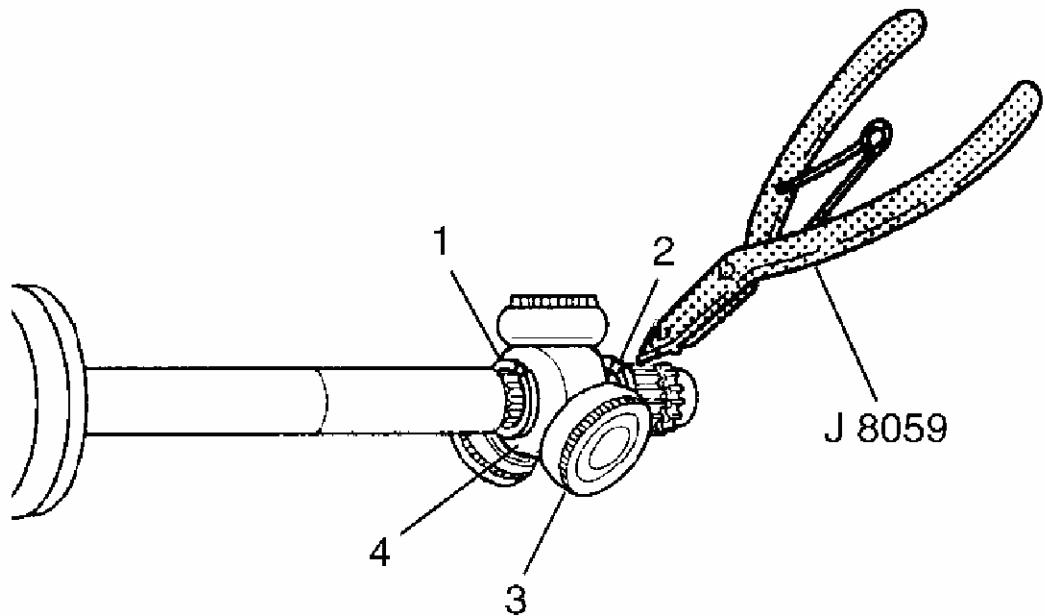


Fig. 13: Installing Spider Assembly & Spacer Rings

Courtesy of GENERAL MOTORS CORP.

6. Slide the tripot joint spider assembly (4) toward the spacer ring (1) as far as it will go on the halfshaft bar.
7. Install the spacer ring (2) in the groove of the halfshaft bar.

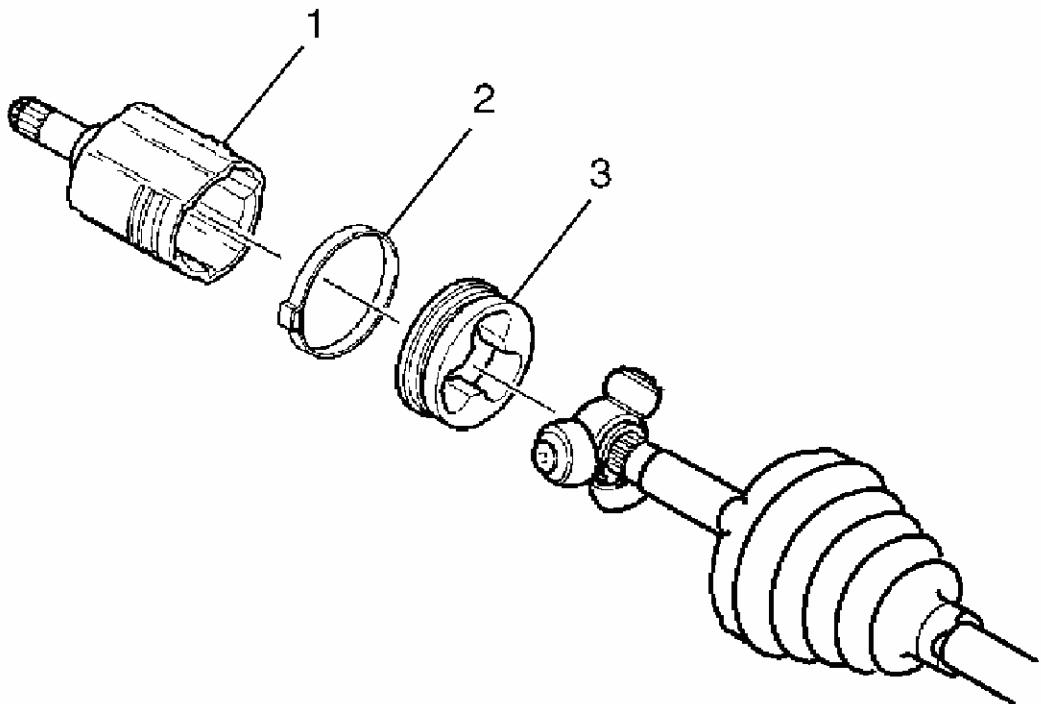


Fig. 14: Seal Retaining Clamp, Tripot Bushing & Housing
Courtesy of GENERAL MOTORS CORP.

8. Place approximately half of the grease from the service kit in the halfshaft inboard seal. Use the remainder of the grease to repack the housing.

IMPORTANT: Ensure the trilobal tripot bushing (3) is flush with the face of the housing (1).

9. Install the new trilobal tripot bushing (3) to housing (1).
10. Position the larger new seal retaining clamp (2) on the halfshaft inboard seal.
11. Slide the housing (1) over the tripot joint spider assembly on the halfshaft bar.

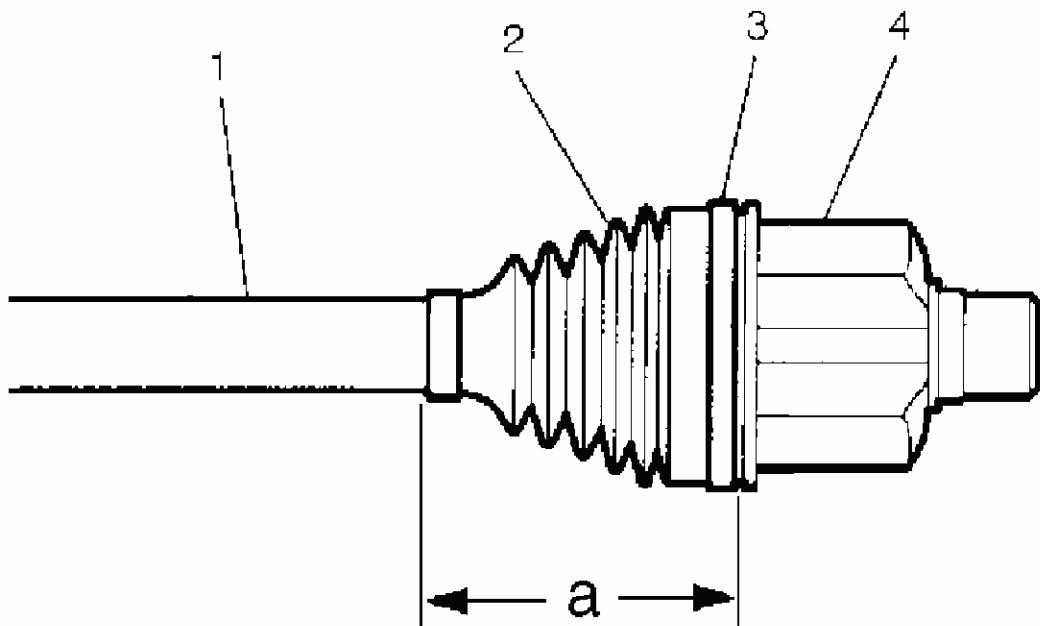


Fig. 15: Identifying Axle Shaft/CV Joint Assembly Components And Installed Boot Measurement Dimension

Courtesy of GENERAL MOTORS CORP.

12. Slide the large diameter of the halfshaft inboard seal (2), with the larger clamp (3) in place, over the outside of the trilobal tripot bushing and locate the lip of the seal in the groove.
13. Position the joint assembly at the proper vehicle dimension.
 - For 4.0L and 3.8L supercharged engine vehicles, dimension a = 111 mm (4.37 in).
 - For 3.8L engine vehicles, dimension a = 95 mm (3.75 in).
14. Carefully insert a thin flat blunt tool, no sharp edges, between the large seal opening and the trilobal tripot bushing in order to equalize the pressure. Remove the tool.

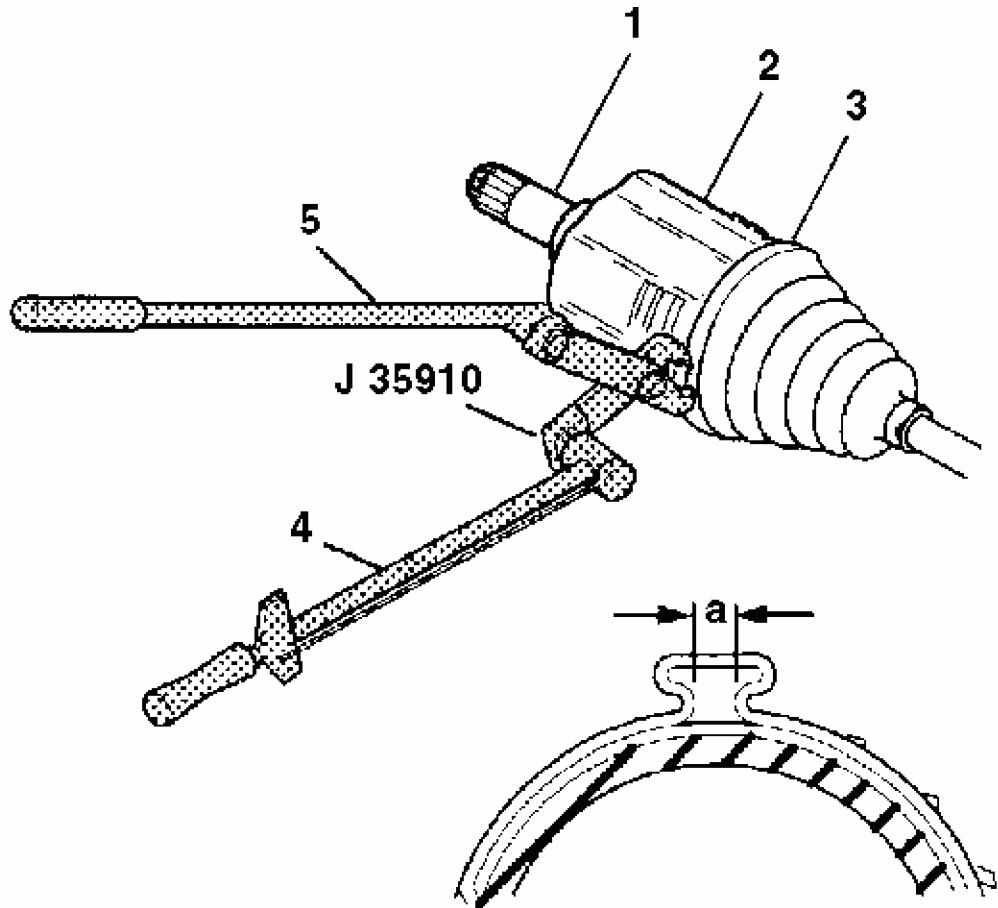


Fig. 16: Adjusting CV Joint Boot Clamp Gap Dimension
Courtesy of GENERAL MOTORS CORP.

15. Align the following items while latching:

- The halfshaft inboard seal
- The tripot housing (2)
- The large seal retaining clamp (3)

Tighten: Crimp the seal retaining clamp with **J 35910** to 176 N.m (130 lb ft). Add the breaker bar (5) and the torque wrench (4) to **J 35910** if necessary.

16. Check the gap dimension (a) on the clamp ear. If gap dimension is larger than shown, continue tightening until gap dimension of 2.60 mm (0.102 in) is reached.

Tools Required

- **J 35910** Drive Axle Seal Clamp Pliers
- **J 41048** Drive Axle Swage Ring Clamp. See Special Tools.
- **J 8059** Snap Ring Pliers. See Special Tools.

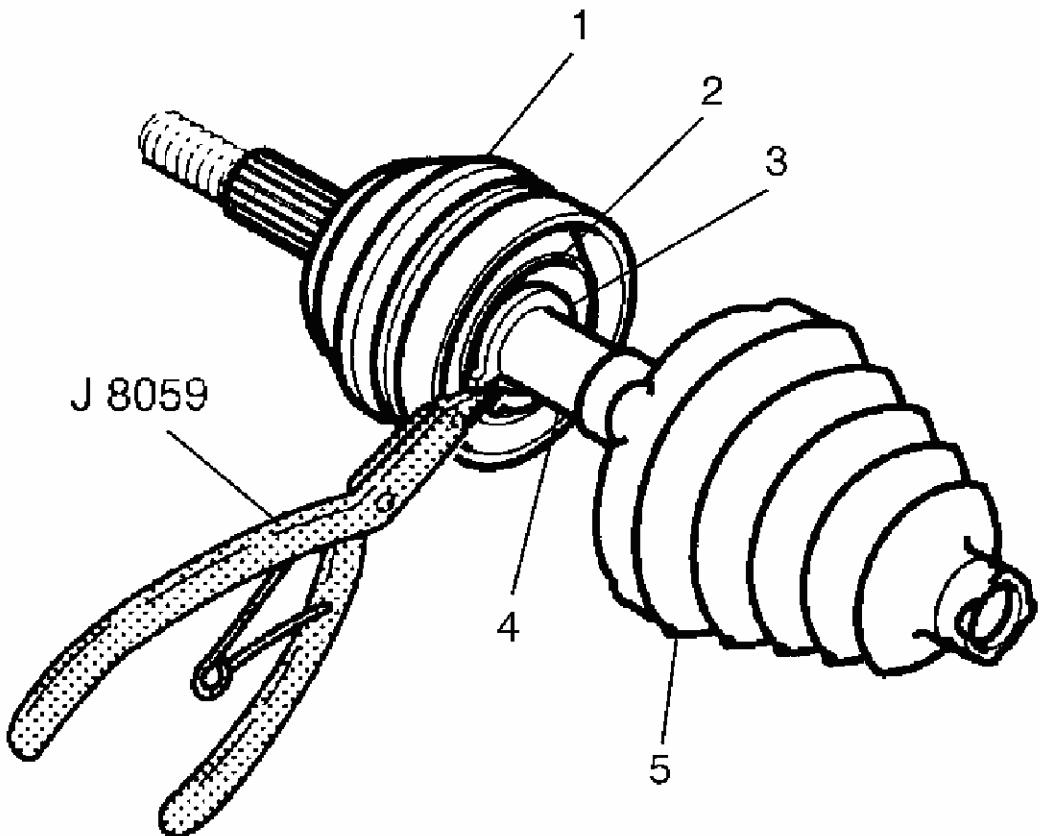
Disassembly Procedure

Fig. 17: Removong Race Retaining Ring
Courtesy of GENERAL MOTORS CORP.

1. Remove the large seal retaining clamp from the CV joint with a side cutter. Discard the seal retaining clamp.
2. Remove the small seal retaining clamp from the halfshaft bar with a side cutter. Discard the seal retaining clamp.
3. Separate the outboard seal (5) from CV joint outer race (1) at the large diameter and slide the seal (5) away from the CV joint along the bar (4).
4. Wipe the grease from the face of the CV joint inner race (2).

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

5. Spread the ears on the race retaining ring (3) using **J 8059** and remove the CV joint assembly from the bar (4). See **Special Tools**.
6. Remove the seal (5) from the bar (4).

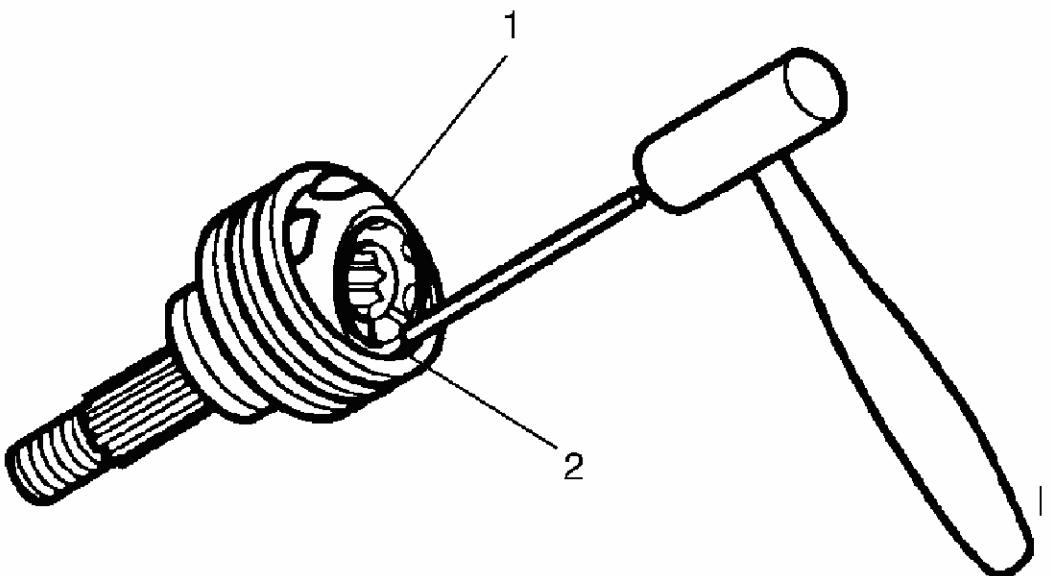


Fig. 18: Taping Gently On Brass Drift With A Hammer In Order To Tilt Cage
Courtesy of GENERAL MOTORS CORP.

7. Use a brass drift and a hammer to gently tap on the CV joint cage (1) until it is tilted enough to remove the first chrome alloy ball (2).
8. Tilt cage in the opposite direction to remove the opposing ball (2).
9. Repeat this process until all balls are removed.

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

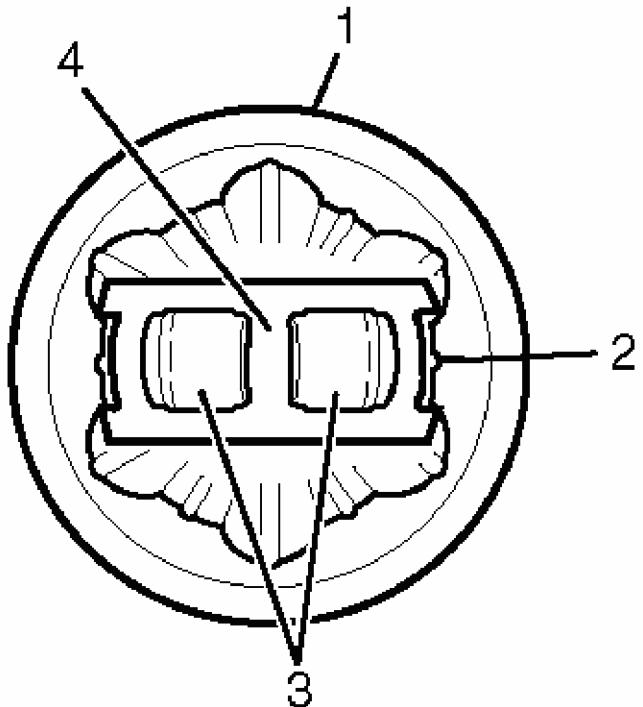


Fig. 19: View Of Outer Race, Inner Race, Cage Window & CV Joint Cage
Courtesy of GENERAL MOTORS CORP.

10. Position the CV joint cage (4) and the CV joint inner race 90 degrees to the centerline of the CV joint outer race (1) and align the CV joint cage windows (3) with the lands of the CV joint outer race (1).
11. Remove the CV joint cage (4) and the CV joint inner race from the CV joint outer race (1).

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

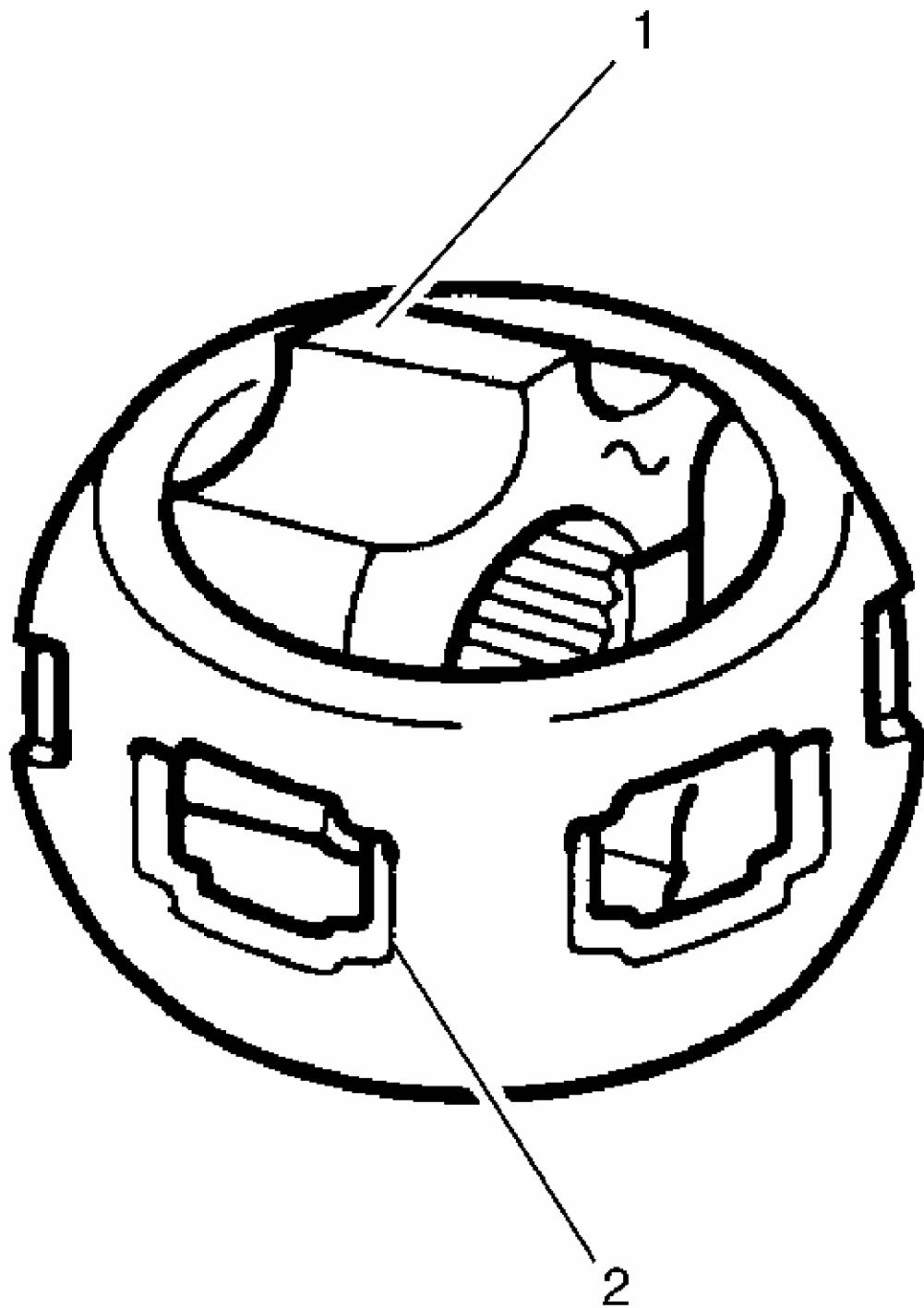


Fig. 20: View Of Inner Race & Cage
Courtesy of GENERAL MOTORS CORP.

12. Rotate the CV joint inner race 90 degrees to the centerline of the CV joint cage with the lands of the CV joint inner race (1) aligned with the windows of the CV joint cage (2).
13. Pivot the inner race into the cage window (2) and remove the inner race (1).
14. Clean the following items thoroughly with cleaning solvent:
 - The inner and outer race assemblies
 - The CV joint cage
 - The balls
15. Remove all traces of old grease and any contaminates.
16. Dry all the parts.

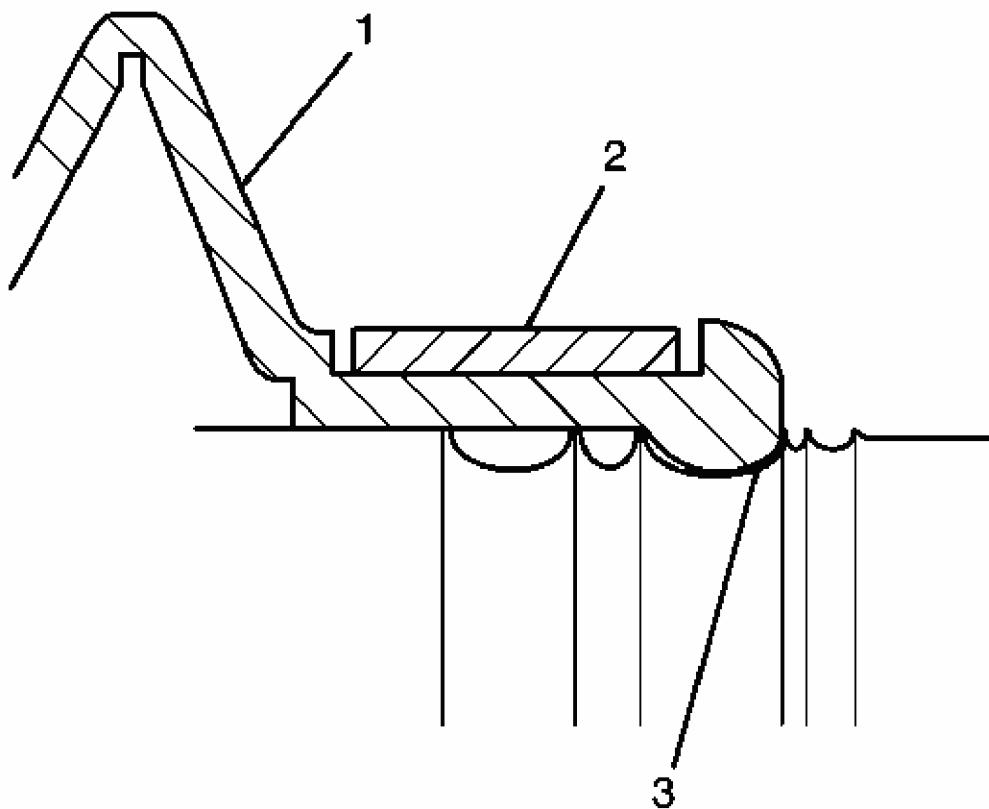
Assembly Procedure

Fig. 21: Installing Seal Clamp On Neck Of Seal
Courtesy of GENERAL MOTORS CORP.

1. Place the new swage ring (2) onto the small end of the joint seal (1). Slide the seal (1)

and the swage ring (2) onto the halfshaft bar.

2. Position the small end of the seal (1) into the seal groove (3) on the halfshaft bar.

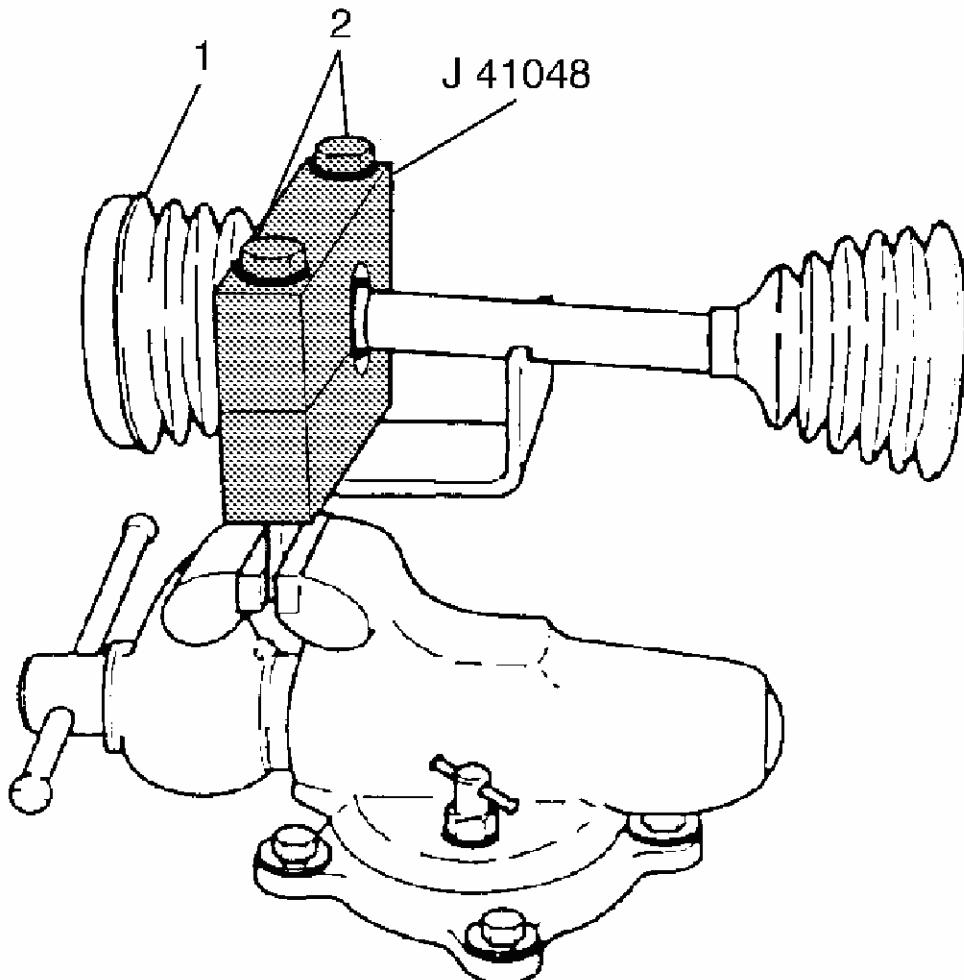


Fig. 22: Swaging Retaining Clamp Ring
Courtesy of GENERAL MOTORS CORP.

3. Mount **J 41048** in a vise and proceed as follows: See Special Tools.
 1. Position the outboard end (1) of the halfshaft assembly in tool **J 41048** . See Special Tools.
 2. Align the top of seal neck on the bottom die using the indicator.
 3. Place the top half of the **J 41048** on the lower half of the **J 41048** . See Special Tools.
 4. Before proceeding, ensure there are no pinch points on the seal. This could cause damage to the seal.

5. Insert the bolts (2).
6. Tighten the bolts by hand until snug.

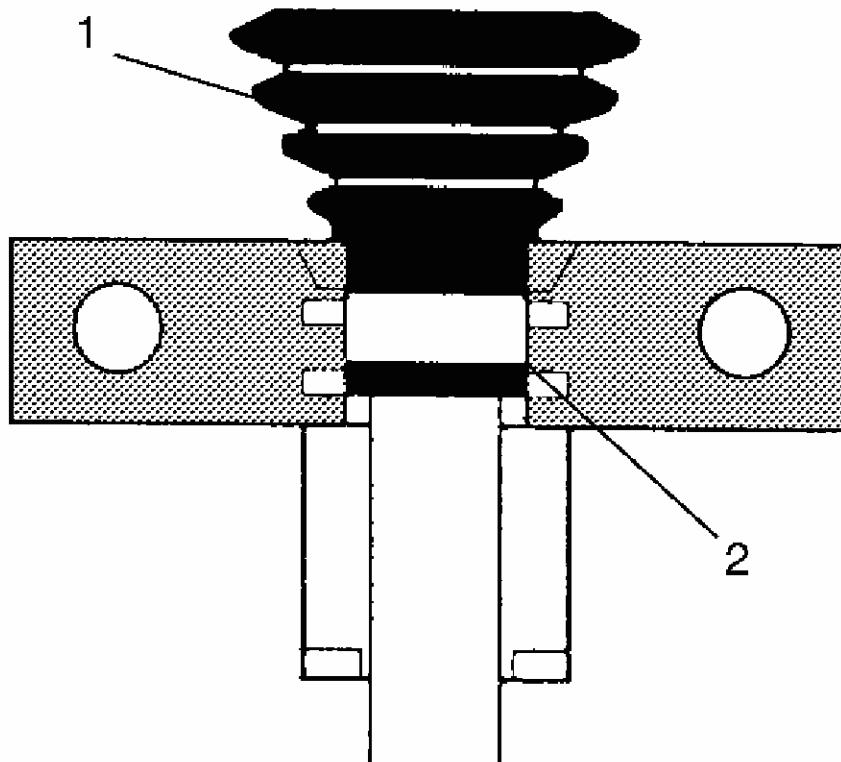


Fig. 23: Identifying Halfshaft Inboard Seal & Swage Ring
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice.

4. Align the following items:

- The seal (1)
- The swage ring (2)
- The halfshaft bar

Tighten: Tighten each bolt of **J 41048** 180 degrees at a time using a ratchet wrench. See Special Tools. Alternate between each bolt until both sides are bottomed.

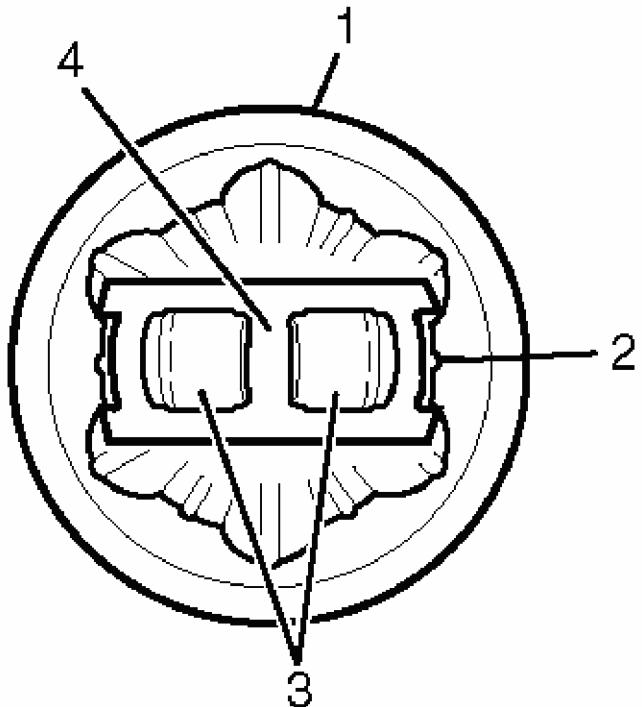


Fig. 24: View Of Outer Race, Inner Race, Cage Window & CV Joint Cage
Courtesy of GENERAL MOTORS CORP.

5. Put a light coat of grease from the service kit on the ball grooves of the inner race and the outer race (1).
6. Hold inner race 90 degrees to the centerline of the cage (4) with the lands of the inner race aligned with the windows of the cage and insert the inner race into the cage.
7. Hold the cage and the inner race 90 degrees to the centerline of the outer race (1) and align the cage windows (3) with the lands of the outer race (2).

IMPORTANT: Ensure that the retaining ring side of the inner race faces the halfshaft bar.

8. Place the cage (4) and the inner race into the outer race (1).
9. Insert the first chrome ball then tilt the cage in the opposite direction to insert the opposing ball.
10. Repeat this process until all balls are in place.
11. Place approximately half the grease from the service kit inside the outboard seal and

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

pack the CV joint with the remaining grease.

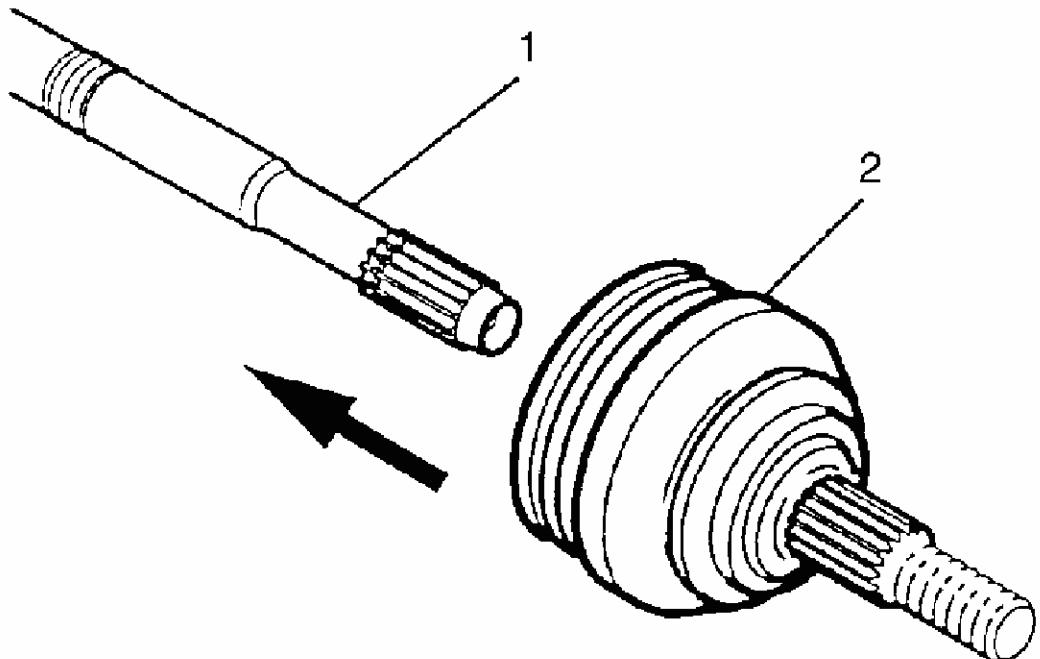


Fig. 25: Pushing CV Joint Onto Halfshaft

Courtesy of GENERAL MOTORS CORP.

12. Push the CV joint (2) onto the halfshaft bar (1) until the retaining ring is seated in the groove on the bar.

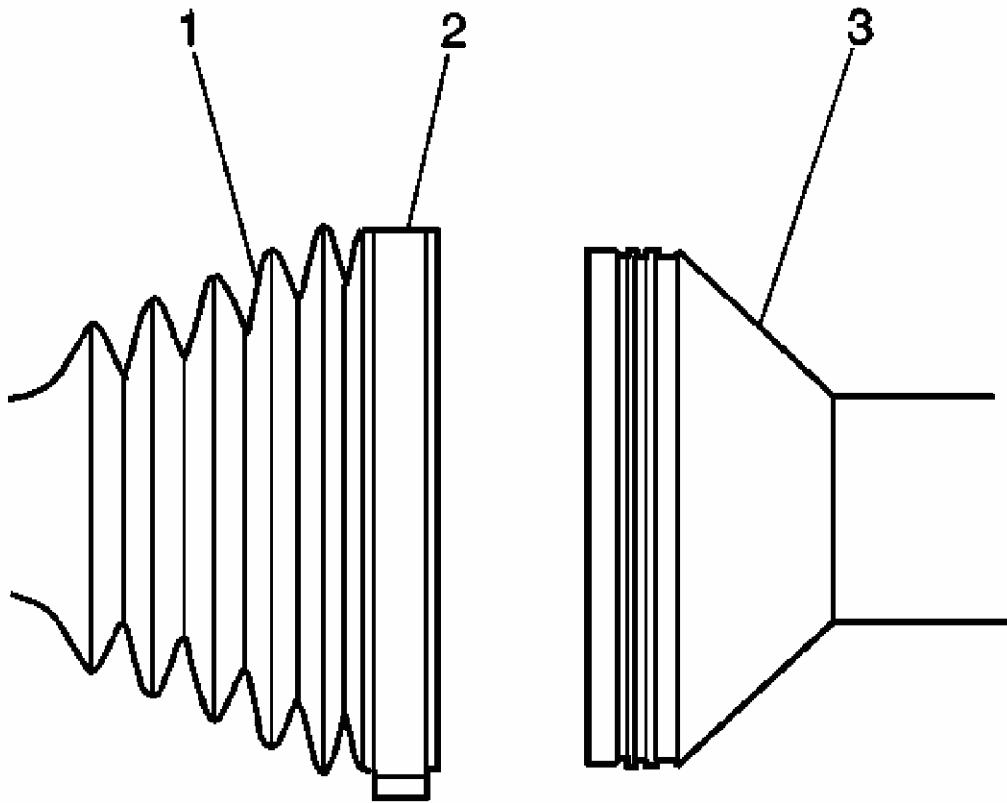


Fig. 26: View Of Boot And Large Seal Retaining Clamp
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The outboard seal (1) must not be dimpled, stretched or out of shape in any way. If the seal (1) is not shaped correctly, equalize the pressure in the seal (1) and shape the seal (1) properly by hand.

13. Slide large diameter of the outboard seal (1) with the large seal retaining clamp (2) in place over the outside of the CV joint outer race (3) and locate the seal lip in the groove on the CV joint outer race (3).

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

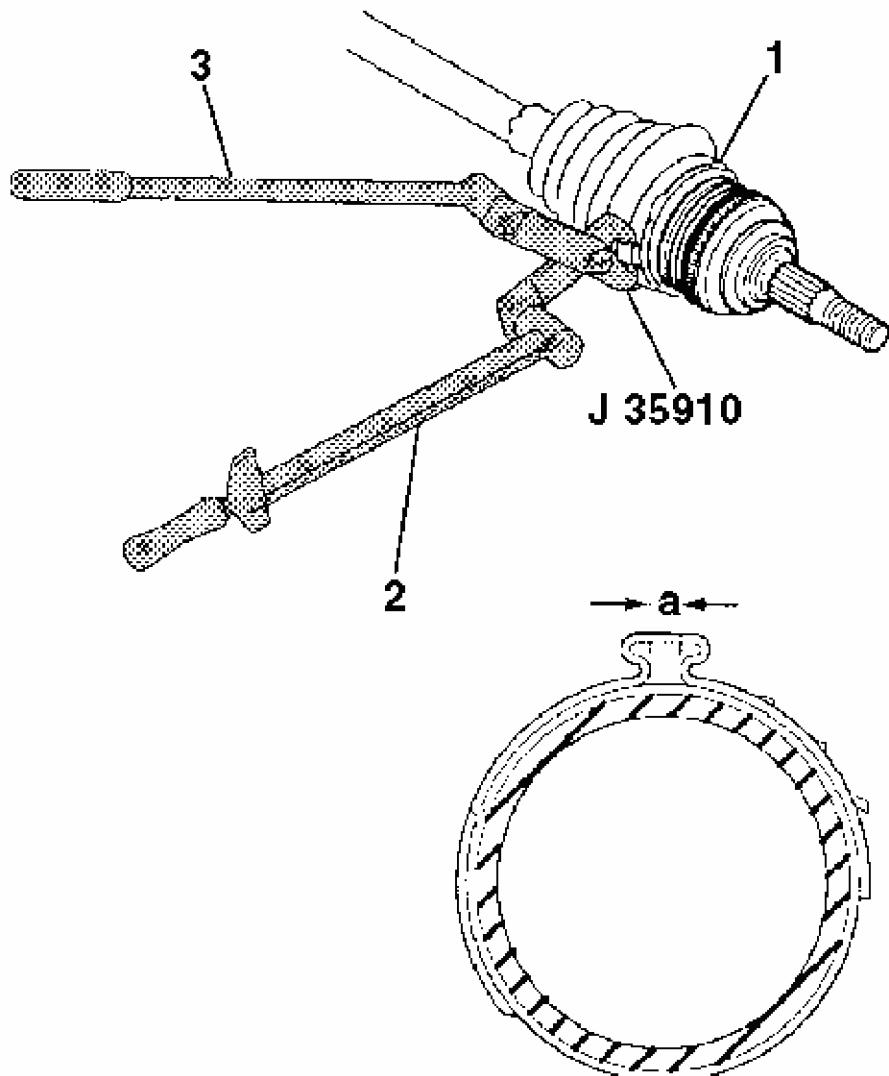


Fig. 27: Crimping Seal Retaining Clamp
Courtesy of GENERAL MOTORS CORP.

14. Crimp the seal retaining clamp (1) using **J 35910**, a breaker bar (3) and a torque wrench (2)

Tighten: Tighten to 176 N.m (130 lb ft).

15. Check the gap dimension on the clamp ear. If the gap dimension is larger than shown, continue tightening until gap dimension of 2.60 mm (0.102 in) is reached

DESCRIPTION AND OPERATION

WHEEL DRIVE SHAFTS DESCRIPTION AND OPERATION

Wheel drive shaft assemblies are flexible assemblies consisting of an inner and outer constant velocity joint connected by an axle shaft. The inner joint is completely flexible and can move in and out. The outer joint is also flexible, but cannot move in and out.

Seal and Clamp

Front wheel drive shaft assemblies use inboard and outboard joint seals made of thermoplastic material and clamps made of stainless steel. The thermoplastic material performs well against normal handling and operational wear and conditions. However, it is not strong enough to withstand abusive handling or damage due to objects such as sharp tools or the sharp edge of any other surrounding component in the vehicle.

IMPORTANT: The seals should be protected from sharp tools and from the sharp edges of surrounding components. Any damage to the seals or clamps will result in leakage. Leakage will allow grease to leak out of the inboard and outboard joints. Leakage will allow water to leak into the inboard and outboard joints. This leads to noisy wheel drive shaft operation and eventually, failure of the internal components.

The functions of the seal are as follows:

- To protect the internal parts of the inboard and outboard joint by protecting the grease from surrounding detrimental atmospheric conditions such as extreme temperatures, ozone gas, etc.
- To protect the internal parts of the inboard and outboard joint by protecting the grease from foreign materials such as stones, dirt, water, salt, etc.
- Facilitate angular and axial movement of the inboard joint.
- Facilitate angular movement of the outboard joint.

The function of the clamps is to provide a leak proof connection at the housing and the axle shaft for the inboard and outboard joints.

Inner Joint

The inner joints are of the tripot design without an over extension limitation retainer. The left wheel drive shaft uses a female spline which installs over a stub shaft protruding from the transaxle. The right wheel drive shaft incorporates a male spline and interlocks with the transaxle gears using barrel type snap rings.

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

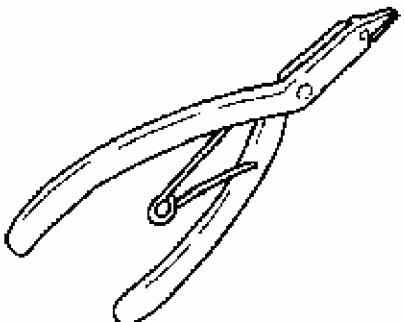
Outer Joint

The outer joints use the constant velocity (CV) joint design. The shaft end mating with the knuckle/hub, incorporates a helical spline to assure a tight, press type fit. The design provides a no end play condition between the hub bearing and the wheel drive shaft.

SPECIAL TOOLS AND EQUIPMENT

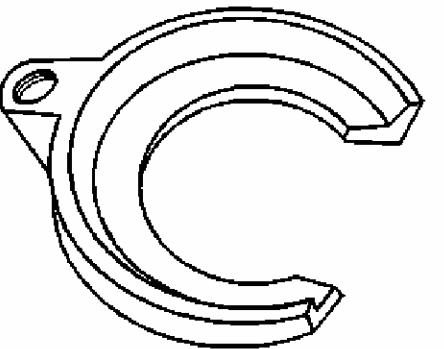
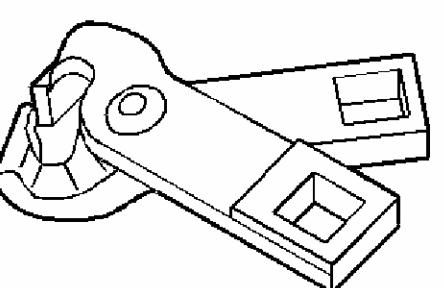
SPECIAL TOOLS

Special Tools

Illustration	Tool Number/Description
	J 2619-O1 Slide Hammer With Adapter
	J 8059 Snap Ring Pliers
	J 29794
	Axe Shaft Remover Extension

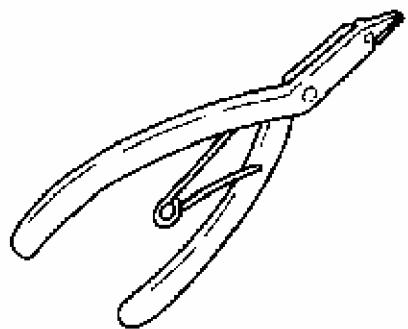
2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

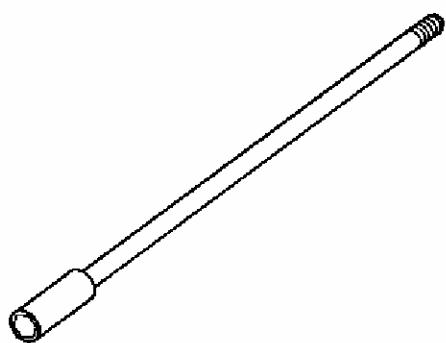
Illustration	Tool Number/Description
	<p>J 2619-O1 Slide Hammer With Adapter</p>
	<p>J 8059 Snap Ring Pliers</p> <p>J 33008-A Axe Shaft Puller</p>
	<p>J 35910 Drive Axle Seal Clamp Pliers</p>

2006 Buick Lucerne CXS

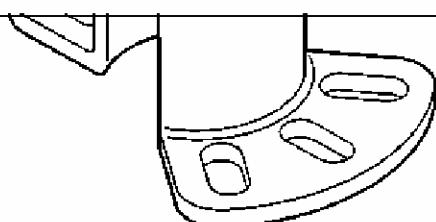
2006 Driveline/Axle Wheel Drive Shafts - Lucerne



J 41048
Drive Axle Swage Ring Clamp



J 29794
Axele Shaft Remover Extension



J 42129
Wheel Hub Remover

J 33008-A
Axele Shaft Puller

2006 Buick Lucerne CXS

2006 Driveline/Axle Wheel Drive Shafts - Lucerne

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